



Terrestrial Planet Finder - Coronagraph (TPF-C) Instrument Concept Studies

Pre-Proposal Conference

Eric Smith
NASA Head Quarters
March 18, 2005



Meeting Agenda



TPF-C ICS Pre-Proposal Workshop Agenda

Lowes L'Enfant Plaza Hotel, Washington, DC

480 L'Enfant Plaza, SW

Renoir Room, 2nd Floor

March 18, 2005

Agenda

Start	Duration	Friday, March 18	Speaker
8:00 AM	0:30	Coffee	
8:30 AM	0:15	Welcome address and meeting logistics	Smith/NPRS
8:45 AM	0:15	Purpose of TPF-C ICS NRA	Smith/NPRS
9:00 AM	0:00		
9:00 AM	0:30	Science Goals	Smith/Lawson
9:30 AM	0:00	Flight Baseline Concept	
9:30 AM	0:15	Mission, orbit, launch vehicle	Lisman
9:45 AM	0:15	Spacecraft - power, data rate, pointing	Lisman
10:00 AM	0:15	Payload System Description	Lisman/Ford
10:15 AM	0:15	Optical Telescope Assembly	Ohl
10:30 AM	0:15	Facility Starlight Suppression System	Mouroulis
10:45 AM	0:00		
10:45 AM	0:15	Break	
11:00 AM	0:00		
11:00 AM	0:00	Proposal Guidelines	
11:00 AM	0:20	General proposal requirements and evaluation criteria	Smith
11:20 AM	0:20	Additional proposal information and evaluation criteria	Ford/Amed
11:40 AM	0:20	Study deliverables - instrument design, performance, modeling	Ford/Amed
12:00 PM	0:00		
12:00 PM	1:30	Lunch	
1:30 PM	0:00		
1:30 PM	0:45	Q & A	Smith leads
2:15 PM	0:15	Recap and closing	
2:30 PM	0:00	Adjourn	

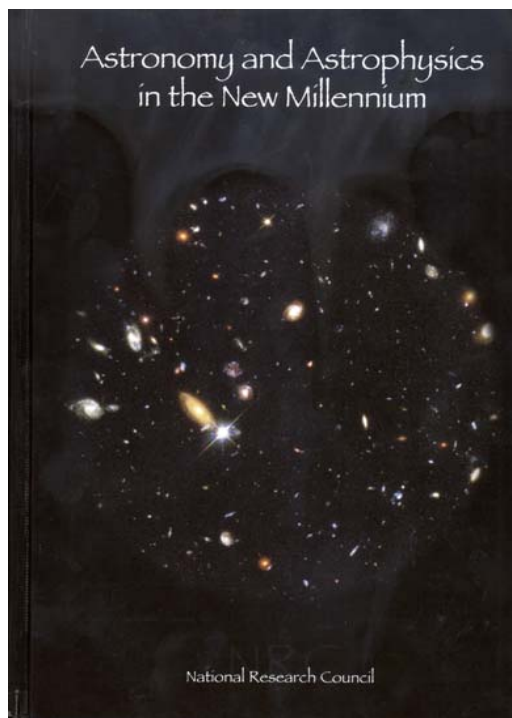


Scientific and Programmatic Basis for NASA's Planet Finding Program



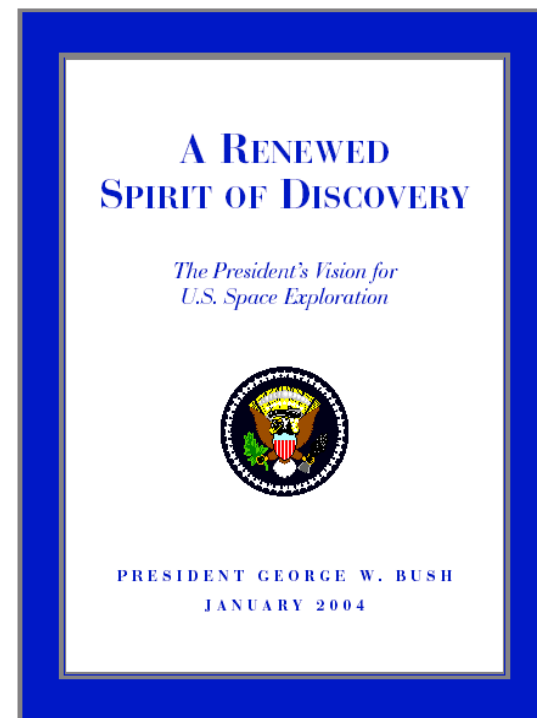
Terrestrial Planet Finder

TPF



The 2000 NRC
Decadal Review

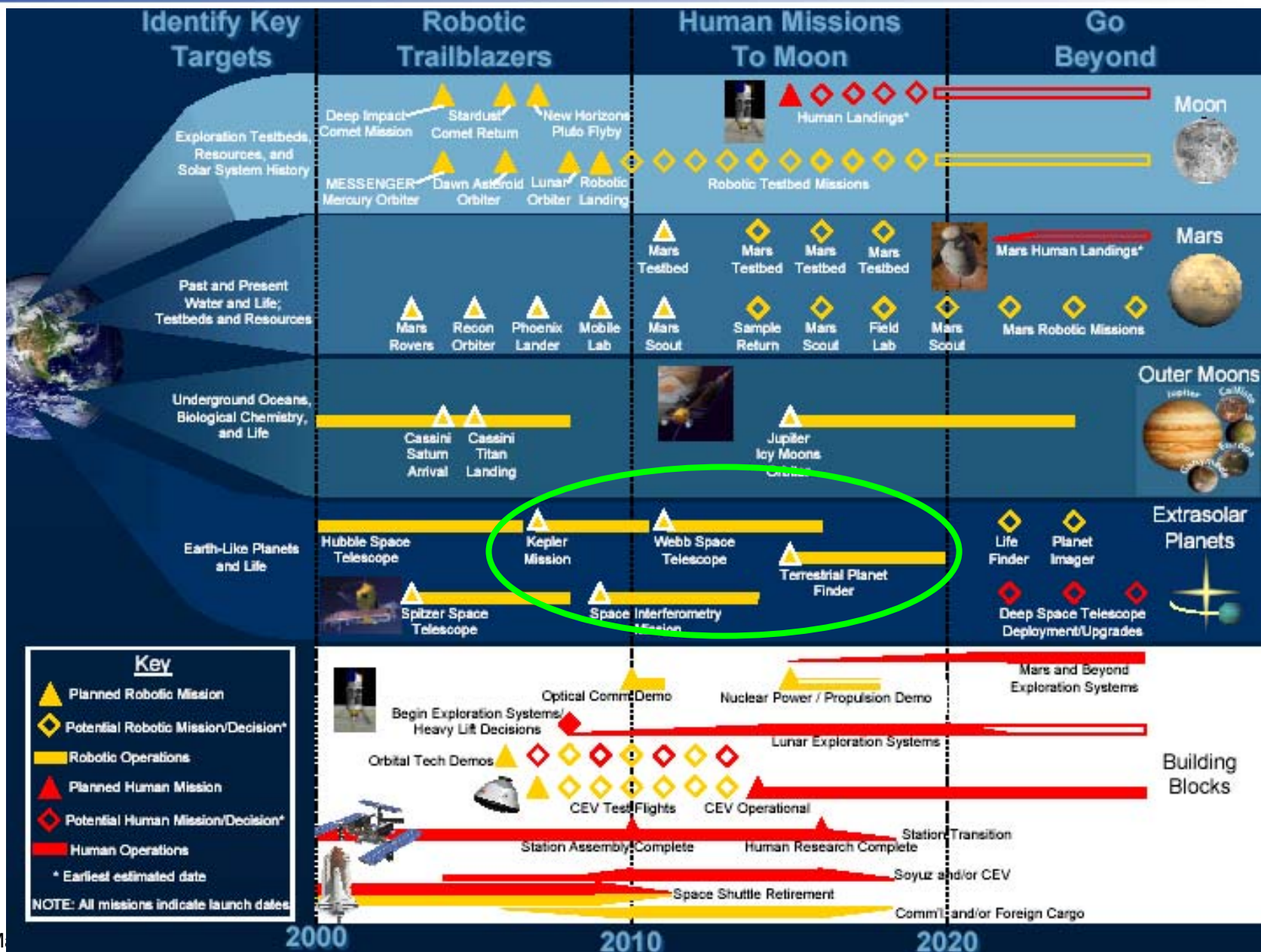
“Search for life beyond Earth, and if it is found, determine its nature and its distribution [in the Galaxy]”



Vision for Space
Exploration

“Conduct advanced telescope searches for Earth-like planets and habitable environments around other stars”

NASA's Plans for Implementing the Vision for Space Exploration





NASA Planet Finding Activities - Goals and Projects

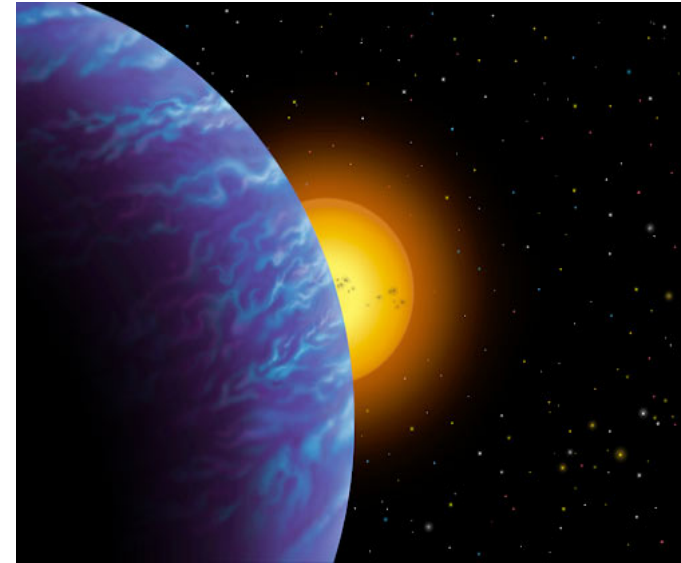
- **Basic Goal - Search Life Outside the Solar System**
 - Find scientific answers to fundamental questions: Are we alone? Where did we come from?
- **Projects**
 - Ground-based Interferometers:
 - Keck Interferometer (KI), and Outrigger Telescopes Project (OTP)
 - Large Binocular Telescope Interferometer (LBTI)
 - Kepler Mission (Discovery class)
 - Space Interferometry Mission (SIM Planet Quest)
 - Terrestrial Planet Finder (TPF)





TPF Science Goals

- Direct detection of **terrestrial planets** in the habitable zone around nearby stars
- Characterization of planetary atmospheres in search of the **signatures of life**
- Direct detection and characterization of **other constituents of planetary systems**
- Revolutionary **general astrophysics** investigations

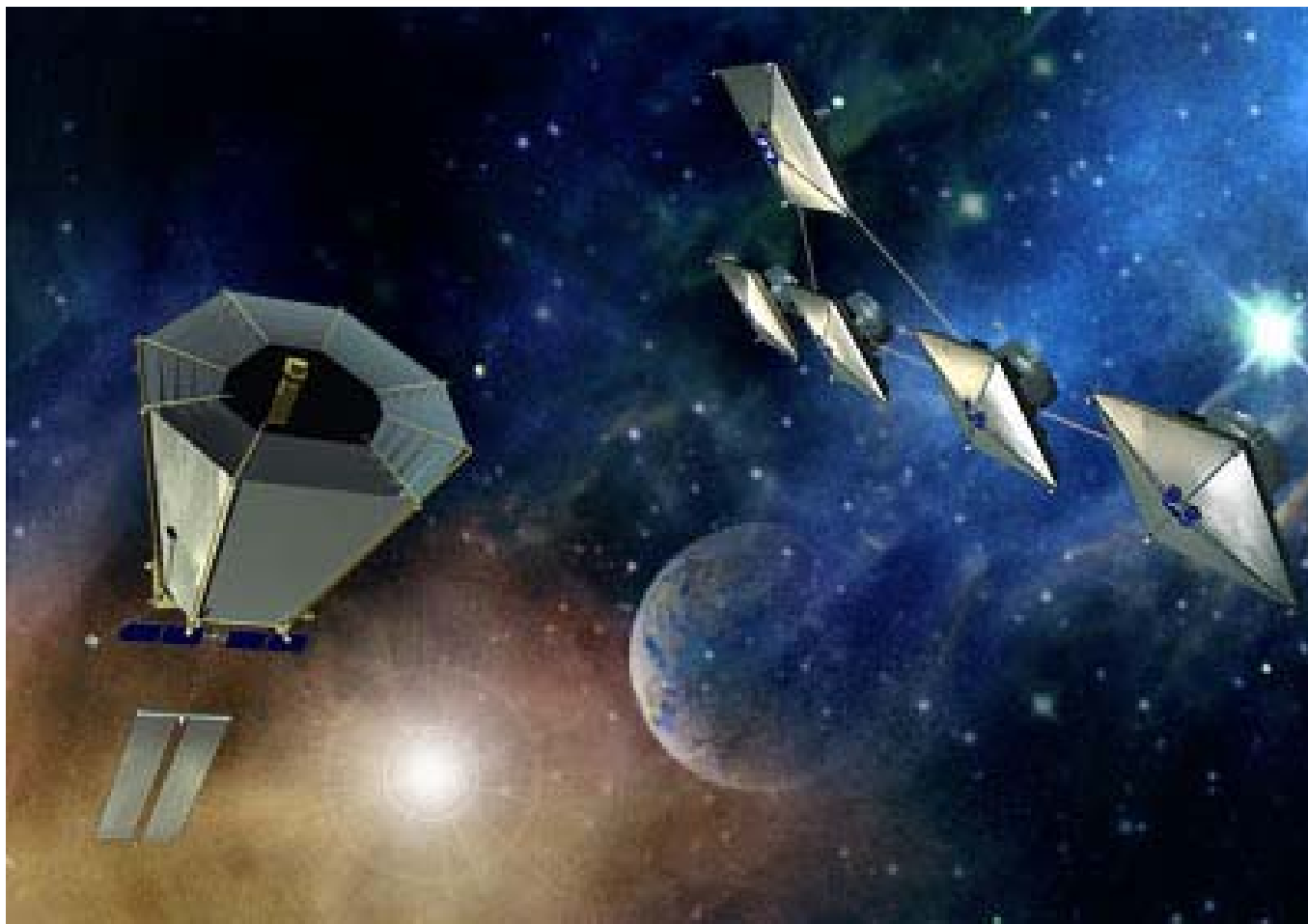


Current TPF Architectures



Terrestrial Planet Finder

TPF



Visible Coronagraph

Formation Flying IR
Interferometer



TPF-C Science & Technology Definition Team (STDT)

STDT purpose:

- If the consensus concept is accepted as a new mission in the science mission roadmap, the discipline Division Director appoints the science participants for Science and Technology Definition Teams (STDT) to mature the concept from an advanced concept into a pre-concept.
- The Centers involved in the activity (the Project), support the STDT with spacecraft concept studies, costing, engineering analysis, and technology support.

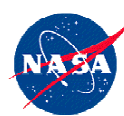
STDT charter

- The STDT product, a report, is coordinated with the science community using the science advisory bodies, and contains the following information as a minimum:
 - Science objectives
 - Operations concepts
 - Mission design architectures
 - Spacecraft concepts
 - Cost, schedule, and risk, and,
 - Identification of required new technology

STDT additional rules:

- STDT is dissolved before the issuance of an AO for mission instruments, because the presence of an STDT during an instrument solicitation may be viewed as giving one investigator a competitive advantage over another.





TPF-C STDT cont'd

STDT purpose:

- Members of the STDT will work in collaboration with JPL and GSFC Project staff, NASA HQ, and the astronomical community to develop the mission concept during its pre-formulation phase (pre-Phase A). The STDT is expected to act as the science conscience of the project.

STDT duties:

- Develop a mature set of TPF-C science requirements
- Evaluate potential general astrophysics investigations
- Describe an implementation of mission science in the form of a Design Reference Mission (DRM)
- Provide assessments of design concepts and operational scenarios and their impact on the science performance of the mission
- Identify needed technology developments
- Make a recommendation to NASA on the approach for conducting the end-to-end science program
- Assist NASA, with the project team, in explaining the goals of TPF-C to the larger astronomical community
- TPF-C Project and the STDT will produce a consensus final report for NASA HQ that serve as the basis for the documentation and reviews required for the Project to enter Phase A



TPF-C STDT Membership



TPF-C STDT		
Name	Affiliation	Key Expertise
Kasting, James (Chair)	Penn State University	Astrobiology Exoplanets General Astrophysics Optics/Coronagraph Instrumentation Spacecraft/Operations
Meadows, Vikki	IPAC/NAI	
Kuchner, Mark	Princeton University	
Oppenheimer, Ben	AMNH	
Burrows, Chris	Independent consultant	
Angel, Roger	University of Arizona	
Clampin, Mark	GSFC	
Trauger, John	JPL	
Seager, Sara	Carnegie Institute of Washington	
Traub, Wesley	SAO	
Brown, Bob	STScI	
Hammel, Heidi	Space Science Institute	
Lin, Doug	UC Santa Cruz	
Brown, Mike	CalTech	
Marley, Mark	NASA/Ames	
Illingworth, Garth	UCO Lick	
Dressler, Alan	Carnegie Institute of Washington	
Ferguson, Harry	STScI	
Noecker, Charley	Ball Aerospace	
Horner, Scott	Lockheed-Matrin	
Kasdin, Jeremy	Princeton University	
Heap, Sally (ex-officio)	GSFC	
Stapelfeldt, Karl (ex-officio)	JPL	



TPF-C Instrument Concept Studies



ROSES'05 NRA for Instrument Concept Studies

- core science instruments
 - Planet Detection Camera
 - Planet Characterization Spectrometer
- stand alone general astrophysics instrument(s)

ICS schedule

- Start: mid August 2005
- Duration: 6 months

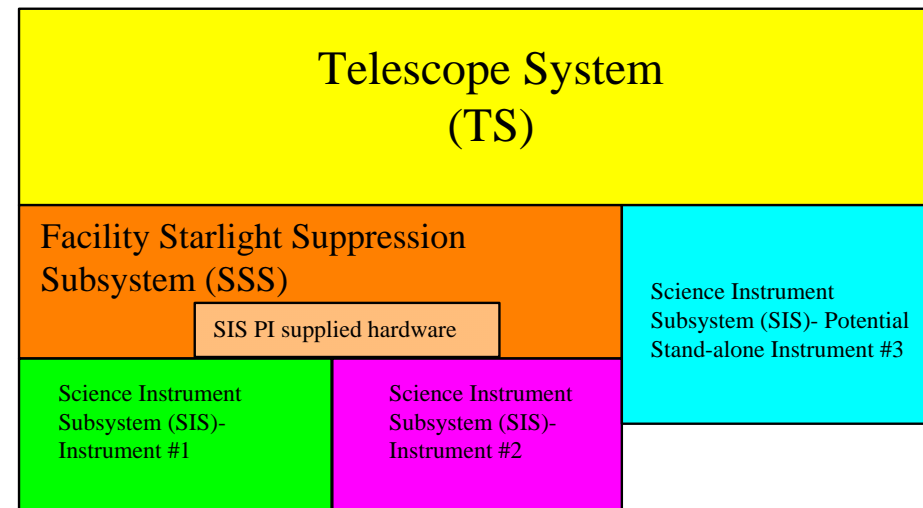
Study products

- Interim report (mid November 2005)
- Final report (mid February 2006)

NASA to issue AO for TPF-C instruments in mid 2006

- TPF-C system performance based on STDT and ICS reports (Level 1)
- Selections in late 2006
- Enter Phase A early 2007

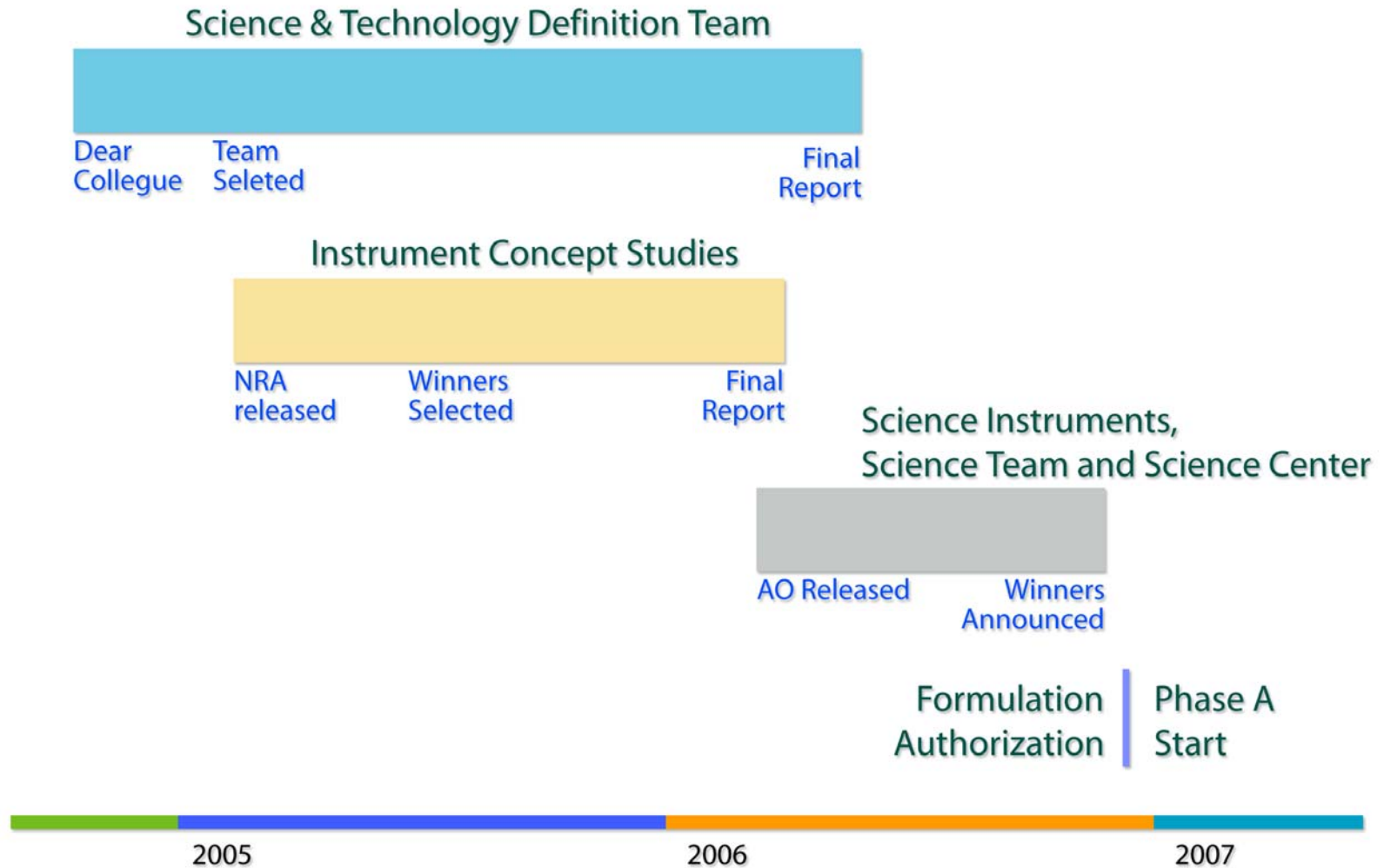
TPF-C Payload Block Diagram



The Road to Phase A



TPF
Terrestrial Planet Finder





TPF-C Instrument Concept Studies

Basic rules for the Core Science Instruments:

- Scientific instruments should be capable, within the scope of the TPF-C mission, of achieving at least one of the core scientific goals of TPF and/or carrying out studies of fundamental astrophysics interest
- PI supplied hardware and/or software may be included for integration into the facility provided Starlight Suppression System. Proposals may include a separate SSS as part of their instrument, but their SSS must be compatible with the baseline optical train and must not interfere with the performance of the facility provided SSS.

Basic rules for General Astrophysics

- General Astrophysics instrument(s) can not drive the OTA design in a way that affects negatively the core science capabilities. However, any telescope design capable of detecting and characterizing extra-solar terrestrial planets will do great astrophysics.

